Element/Isotope/Ion/Nuclide Symbol Name: Key

Definitions:

Element: ~An atom with the same number of protons (p^+)
- ~ Atoms with the same atomic number (# of p^+)
- ~ If you change the number of protons, you change the element

Isotope: ~An element with the same number of protons (p^+), but different numbers of neutrons (n^0)
- ~ Each element has several isotopes. Some are stable, while some are unstable.
- ~ If you change the number of neutrons, you change the mass AND the isotope.

Ion: ~ An atom with a charge
- ~ Neutral atoms are not ions because the Charge is "0" ($\#p^+ = \#e^-$)
- ~ An ion is created when electrons are lost or gained. ($\#p^+ \neq \#e^-$)
- ~ If you change the number of electrons, you change the charge
- ~ Two types of Ions:
  - ~ Cation = positive charge (more p^+ than e^-) - loses electrons
  - ~ Anion = negative charge (more e^- than p^+) - gains electrons

Nuclide Symbol: Symbolic way to represent the quantity of protons, neutrons and electrons that can be found in an atom
- ~ Ex: ${}^{AM}_{AN}X^{Charge}$
  - ~ X = Any Symbol to represent and element (He = Helium)
  - ~ AN = Atomic Number = $\#p^+$
  - ~ AM = Atomic Mass = $\#p^+ + \#n^0$
  - ~ Charge = $\#p^+ - \#e^-$

Isotope Symbol: Symbolic way to represent the isotope's mass
- ~ Ex: Carbon-14 or C-14
  - ~ Atom is identified through the name or symbol
  - ~ Mass is identified through the number
  - ~ When using this symbol, the charge is undetermined

Problems: Write the nuclide symbol with the following information: $p^+=13$, $n^0=14$ & $e^-=13$
- ~ Step 1 = If $p^+=13$, then you must be talking about Aluminum (Al). The atomic # = 13.
- ~ Step 2 = If there are $13p^+$ and $14n^0$, then the atomic mass must be 27 (13+14).
- ~ Step 3 = If there are $13p^+$ and $13e^-$, then the charge must be 0 (13-13).
- ~ Step 4 = Use the information to write the nuclide symbol: ${}^{27}_{13}Al^0$ or ${}^{27}_{13}Al$

For questions 1-3, write the nuclide symbol from the following information.

1) $p^+ = 20$, $n^0 = 20$, $e^- = 18$ — $^{40}_{20}Ca^{+2}$

2) $p^+ = 14$, $n^0 = 14$, $e^- = 14$ — $^{28}_{14}Si$

3) $p^+ = 17$, $n^0 = 18$, $e^- = 18$ — $^{35}_{17}Cl^{-1}$

For questions 4-6, use the nuclide symbol to determine the quantity of p^+, n^0 & e^-.

4) $^{40}_{18}Ar$
- $p^+ = 18$
- $n^0 = 22$
- $e^- = 18$

5) $^{7}_{3}Li^{+1}$
- $p^+ = 3$
- $n^0 = 4$
- $e^- = 2$

6) $^{19}_{9}F^{-1}$
- $p^+ = 9$
- $n^0 = 10$
- $e^- = 10$

For questions 7-9, use the isotope symbol to determine the quantity of p^+, n^0 & e^-.

7) Bromine-80
- $p^+ = 35$
- $n^0 = 45$
- $e^- = 35$ *

8) Silver-109
- $p^+ = 47$
- $n^0 = 62$
- $e^- = 47$ *

9) Sulfur-32
- $p^+ = 16$
- $n^0 = 16$
- $e^- = 16$ *

* ASSUMED NEUTRAL

For questions 10-14, fill in all of the missing values in the chart below:

	10)	11)	12)	13)	14)
Isotope Symbol	Phosporus-31	Be-9	Fe-56	Kr-84	Se-79
Protons	15	4	26	84 - 48 = 36	34
Neutrons	31 - 15 = 16	5	56 - 26 = 30	48	79 - 34 = 45
Electrons	18	2	23	36	34 + 2 = 36
Atomic Mass	31	9	56	84	79
Nuclide Symbol	$^{31}_{15}P^{-3}$	$^{9}_{4}Be^{+2}$	$^{56}_{26}Fe$	$^{84}_{36}Kr$	$^{79}_{34}Se^{-2}$